FLUVIEW

A Weekly Influenza Surveillance Report Prepared by the Influenza Division

2008-2009 Influenza Season
Week 36 ending September 12, 2009

All data are preliminary and may change as more reports are received.

Synopsis: During week 36 (September 6-12, 2009), influenza activity increased in the U.S.

- 1,378 (18.2%) specimens tested by U.S. World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories and reported to CDC/Influenza Division were positive for influenza.
- 99% of all subtyped influenza A viruses being reported to CDC were 2009 influenza A (H1N1) viruses.
- The proportion of deaths attributed to pneumonia and influenza (P&I) was below the epidemic threshold.
- Two influenza-associated pediatric deaths were reported, and both were associated with 2009 influenza A (H1N1) virus infection.
- The proportion of outpatient visits for influenza-like illness (ILI) was above the national baseline. Regions 2, 4, 5, 6, 7, 9, and 10 reported ILI above region-specific baseline levels.
- Twenty-one states reported geographically widespread influenza activity, nine states and Puerto Rico reported regional influenza activity, 11 states and the District of Columbia reported local influenza activity, eight states and Guam reported sporadic influenza activity, one state reported no influenza activity, and the U.S. Virgin Islands did not report.
- The 2009-10 influenza season officially begins October 4, 2009.

National and Regional Summary of Select Surveillance Components

	Data for current week			Data cumulative for the 2008-09 season						
HHS Surveillance Regions*	Out-patient ILI†	% positive for flu‡	Number of jurisdictions reporting regional or widespread activity§	A (H1)	A (H3)	2009 A (H1N1)	A (unable to sub-type)¥	A (Subty-ping not perfor-med)	B	Pediatric Deaths
Nation	Elevated	18.2%	31 of 54	8,166	4,346	41,556	859	21,851	10,795	114
Region 1	Normal	2.2%	1 of 6	584	303	2,934	13	1,707	816	4
Region 2	Elevated	3.6%	2 of 4	290	228	1,813	21	2,393	713	20
Region 3	Normal	11.8%	3 of 6	1,251	221	4,585	20	1,065	1,362	10
Region 4	Elevated	20.7%	8 of 8	958	769	6,682	92	4,195	1,317	12
Region 5	Elevated	20.0%	4 of 6	1,593	212	8,632	203	955	1,383	18
Region 6	Elevated	22.6%	5 of 5	830	311	4,048	7	5,687	2,669	16
Region 7	Elevated	20.2%	2 of 4	534	86	1,270	135	600	537	1
Region 8	Normal	14.9%	1 of 6	540	219	1,760	80	2,080	506	9
Region 9	Elevated	19.6%	3 of 5	1,200	1,680	6,998	74	2,634	806	21
Region 10	Elevated	22.1%	2 of 4	386	317	2,834	214	535	686	3

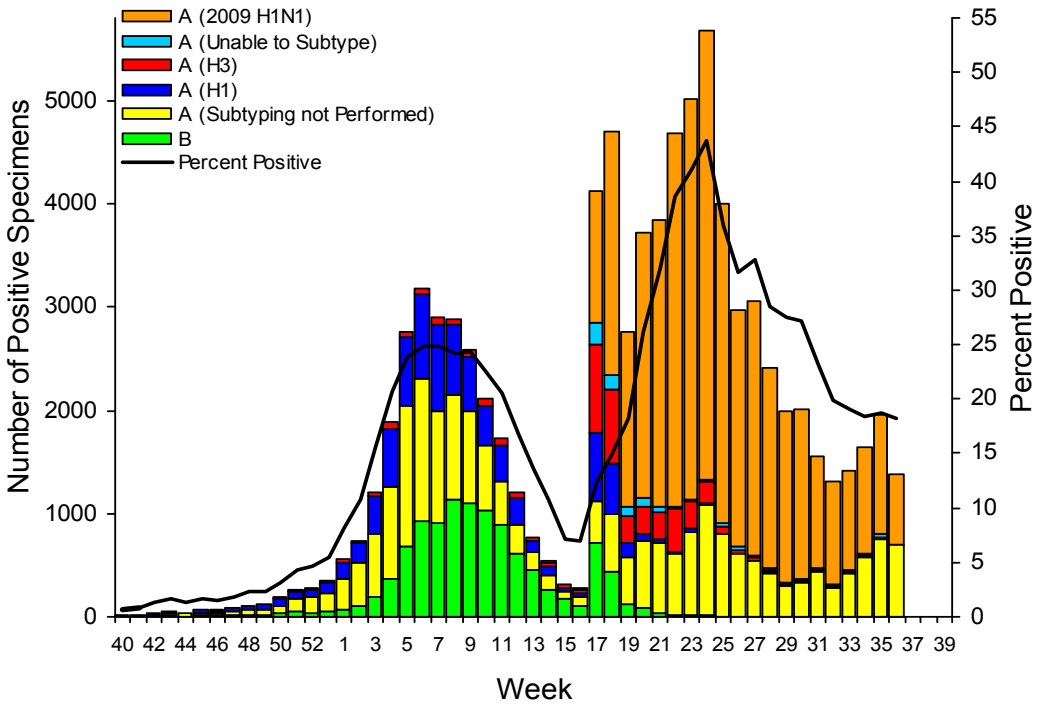
* HHS regions (Region I: CT, ME, MA, NH, RI, VT; Region II: NJ, NY, Puerto Rico, US Virgin Islands; Region III: DE, DC, MD, PA, VA, WV; Region IV: AL, FL, GA, KY, MS, NC, SC, TN; Region V: IL, IN, MI, MN, OH, WI; Region VI: AR, LA, NM, OK, TX; Region VII: IA, KS, MO, NE; Region VIII: CO, MT, ND, SD, UT, WY; Region IX: AZ, CA, Guam, HI, NV; and Region X: AK, ID, OR, WA).
† Elevated means the % of visits for ILI is at or above the national or region-specific baseline.
‡ National data are for current week; regional data are for the most recent three weeks.
§ Includes all 50 states, the District of Columbia, Guam, Puerto Rico, and U.S. Virgin Islands.
¥ The majority of influenza A viruses that cannot be sub-typed as seasonal influenza viruses are 2009 A (H1N1) influenza viruses upon further testing.

U.S. Virologic Surveillance: WHO and NREVSS collaborating laboratories located in all 50 states and Washington D.C. report to CDC the number of respiratory specimens tested for influenza and the number positive by influenza type and subtype. The results of tests performed during the current week are summarized in the table below.

	Week 36
No. of specimens tested	7,569
No. of positive specimens (%)	1,378 (18.2%)
Positive specimens by type/subtype	
Influenza A	1,374 (99.7%)
A (2009 H1N1)	679 (49.4%)
A (subtyping not performed)	693 (50.4%)
A (unable to subtype)	0 (0.0%)
A (H3)	0 (0.0%)
A (H1)	2 (0.1%)
Influenza B	4 (0.3%)

During week 36, seasonal influenza A (H1) and influenza B viruses co-circulated at low levels with 2009 influenza A (H1N1) viruses. Ninety-nine percent of all subtyped influenza A viruses being reported to CDC this week were 2009 influenza A (H1N1) viruses.

Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2008-09



Pneumonia and Influenza Hospitalization and Death Tracking: This new system was implemented on August 30, 2009 and replaces the weekly report of laboratory confirmed 2009 H1N1-related hospitalizations and deaths. Jurisdictions can now report to CDC either laboratory confirmed or pneumonia and influenza syndromic hospitalizations and deaths resulting from all types or subtypes of influenza, not just those from 2009 H1N1 influenza virus. To allow jurisdictions to implement the new case definition, counts were reset to zero on August 30, 2009. From August 30-September 12, 2009 4,569 hospitalizations and 364 deaths associated with influenza virus infection, or based on syndromic surveillance for influenza and pneumonia, were reported to CDC. This is the second week of data from this new system and reflects reports by 56 jurisdictions. CDC will continue to use its traditional surveillance systems to track the progress of the remainder of the 2008-09 season, and the 2009-10 influenza season, which officially begins October 4, 2009.

Antigenic Characterization: CDC has antigenically characterized 2,151 seasonal human influenza viruses [1,189 influenza A (H1), 264 influenza A (H3) and 698 influenza B viruses] collected by U.S. laboratories since October 1, 2008, and 562 2009 influenza A (H1N1) viruses.

All 1,189 seasonal influenza A (H1) viruses are related to the influenza A (H1N1) component of the 2009-10 Northern Hemisphere influenza vaccine (A/Brisbane/59/2007). Two hundred twenty-nine (87%) of 264 influenza A (H3N2) viruses tested are related to the influenza A (H3N2) 2009-10 vaccine component (A/Brisbane/10/2007) and 35 viruses (13%) tested showed reduced titers with antisera produced against A/Brisbane/10/2007.

All 562 2009 influenza A (H1N1) viruses are related to the A/California/07/2009 (H1N1)pdm reference virus selected by WHO as a potential candidate for 2009 influenza A (H1N1) vaccine.

Influenza B viruses currently circulating can be divided into two distinct lineages represented by the B/Yamagata/16/88 and B/Victoria/02/87 viruses. Six hundred twenty-two (89%) of 698 influenza B viruses tested belong to the B/Victoria lineage, and of these, 614 (99%) are related to the influenza vaccine component for the 2009-10 Northern Hemisphere influenza vaccine (B/Brisbane/60/2008), and the remaining eight (1%) showed reduced titers with antisera produced against B/Brisbane/60/2008. Seventy-six (11%) influenza B viruses tested belong to the B/Yamagata lineage.

Data on antigenic characterization should be interpreted with caution given that antigenic characterization data are based on hemagglutination inhibition (HI) testing using a panel of reference ferret antisera, and results may not correlate with clinical protection against circulating viruses provided by influenza vaccination.

Annual influenza vaccination is expected to provide the best protection against those virus strains that are related to the vaccine strains, but limited to no protection may be expected when the vaccine and circulating virus strains are so different as to be from different lineages, as is seen with the two lineages of influenza B viruses. Antigenic characterization of 2009 influenza A (H1N1) viruses indicates that these viruses are antigenically and genetically unrelated to seasonal influenza A (H1N1) viruses, suggesting that little to no protection would be expected from vaccination with seasonal influenza vaccine.

Antiviral Resistance: Since October 1, 2008, 1,148 seasonal influenza A (H1N1), 261 influenza A (H3N2), 654 influenza B, and 574 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir). In addition, 798 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. Also, 1,153 seasonal influenza A (H1N1), 261 influenza A (H3N2), and 526 2009 influenza A (H1N1) viruses have been tested for resistance to the adamantanes (amantadine and rimantadine). Additional laboratories perform antiviral testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories. The results of antiviral resistance testing performed on these viruses are summarized in the table below.

	Viruses tested (n)	Resistant Viruses, Number (%) Oseltamivir	Viruses tested (n)	Resistant Viruses, Number (%) Zanamivir	Viruses tested (n)	Resistant Viruses, Number (%) Adamantanes
Seasonal Influenza A (H1N1)	1,148	1,143 (99.6%)	1,148	0 (0)	1,153	6 (0.5%)
Influenza A (H3N2)	261	0 (0)	261	0 (0)	261	261 (100%)
Influenza B	654	0 (0)	654	0 (0)	N/A*	N/A*
2009 Influenza A (H1N1)	1,497	8†‡ (0.6)	670	0 (0)	526	526 (100%)

*The adamantanes (amantadine and rimantadine) are not effective against influenza B viruses.
†Two screening tools were used to determine oseltamivir resistance: sequence analysis of viral genes and a neuraminidase inhibition assay.
‡ Additional laboratories perform antiviral resistance testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories, bringing the total number to 10.

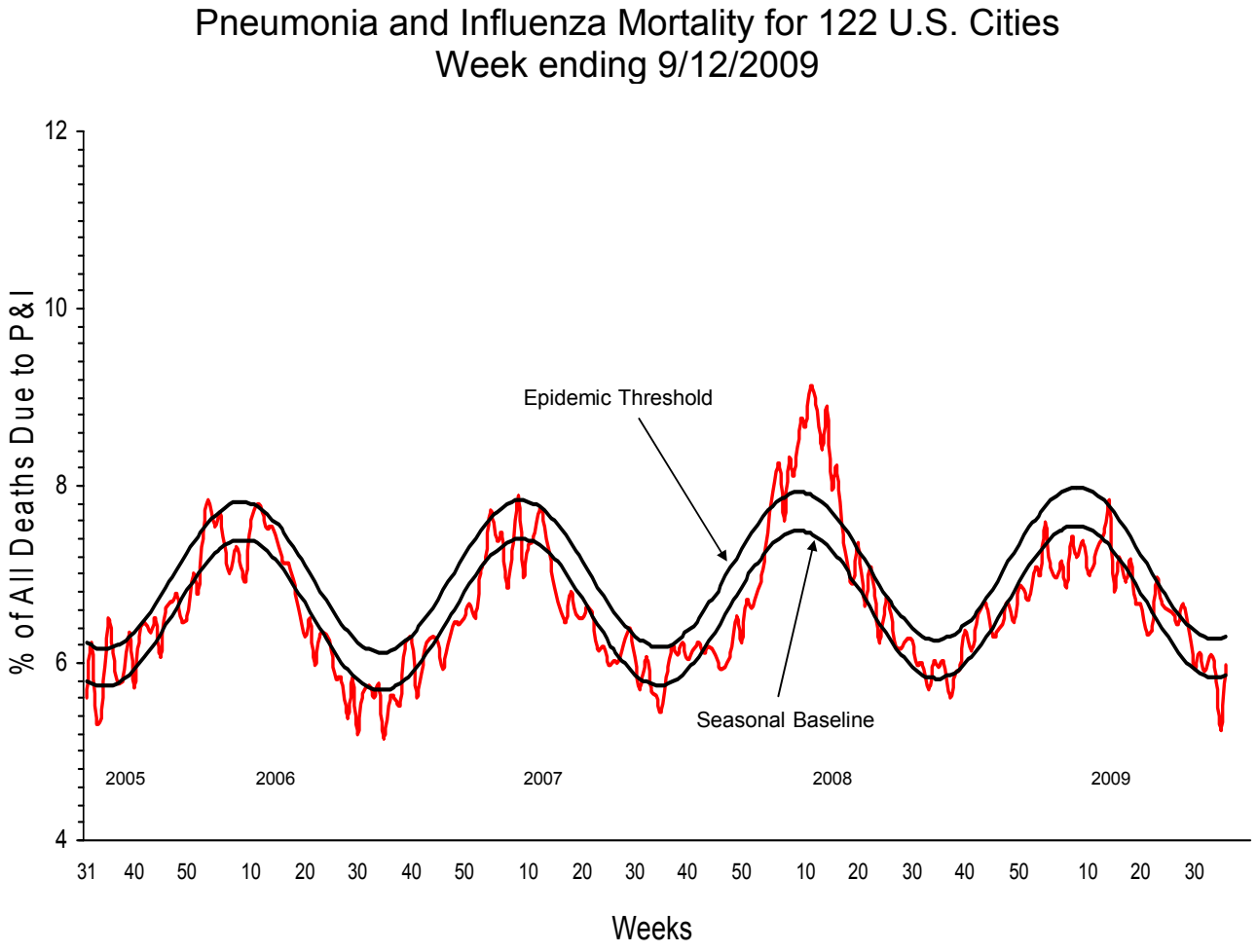
2009 influenza A (H1N1) viruses were tested for oseltamivir resistance by a neuraminidase inhibition assay and/or detection of genetic sequence mutation, depending on the type of specimen tested. Original clinical samples were examined for a single known mutation in the virus that confers oseltamivir resistance in currently circulating seasonal influenza A (H1N1) viruses, while influenza virus isolates were tested using a neuraminidase inhibition assay that determines the presence or absence of neuraminidase inhibitor resistance, followed by the neuraminidase gene sequence analysis of resistant viruses.

The majority of 2009 influenza A (H1N1) viruses are susceptible to the neuraminidase inhibitor antiviral medication oseltamivir; however, rare sporadic cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been detected worldwide, including 10 cases in the United States. All tested viruses retain their sensitivity to the other neuraminidase inhibitor: zanamivir. Nine patients (includes the eight viruses detected at CDC and one identified by an additional laboratory) had documented exposure to oseltamivir through either treatment or chemoprophylaxis, and the remaining patient is currently under investigation to determine exposure to oseltamivir. Occasional development of oseltamivir resistance during treatment or prophylaxis is not unexpected. Enhanced surveillance is expected to detect additional cases of oseltamivir resistant 2009 influenza A (H1N1) viruses, and such cases will be investigated to assess the spread of resistant strains in the community. To prevent the spread of antiviral resistant virus strains, CDC reminds clinicians and the public of the need to continue hand and cough hygiene measures for the duration of any symptoms of influenza (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5832a3.htm).

Additional information on antiviral recommendations for treatment and chemoprophylaxis of influenza virus infection is available at http://www.cdc.gov/h1n1flu/recommendations.htm. Antiviral treatment with oseltamivir or zanamivir is recommended for all patients with confirmed or suspected influenza virus infection who are hospitalized or who are at higher risk for influenza complications.

Three seasonal influenza A (H1N1) viruses collected between February 8 and May 11, 2009, were found to be resistant to both oseltamivir and the adamantanes (amantadine and rimantadine). All seasonal influenza A (H1N1) viruses tested retain their sensitivity to zanamivir. The three dually-resistant viruses represent less than 1% of all seasonal influenza A (H1N1) viruses tested during the 2008-09 influenza season, and as a result, no changes to the influenza antiviral treatment or prophylaxis recommendations will be made at this time. CDC will continue to monitor trends in antiviral resistance over the summer and throughout the upcoming 2009-10 influenza season.

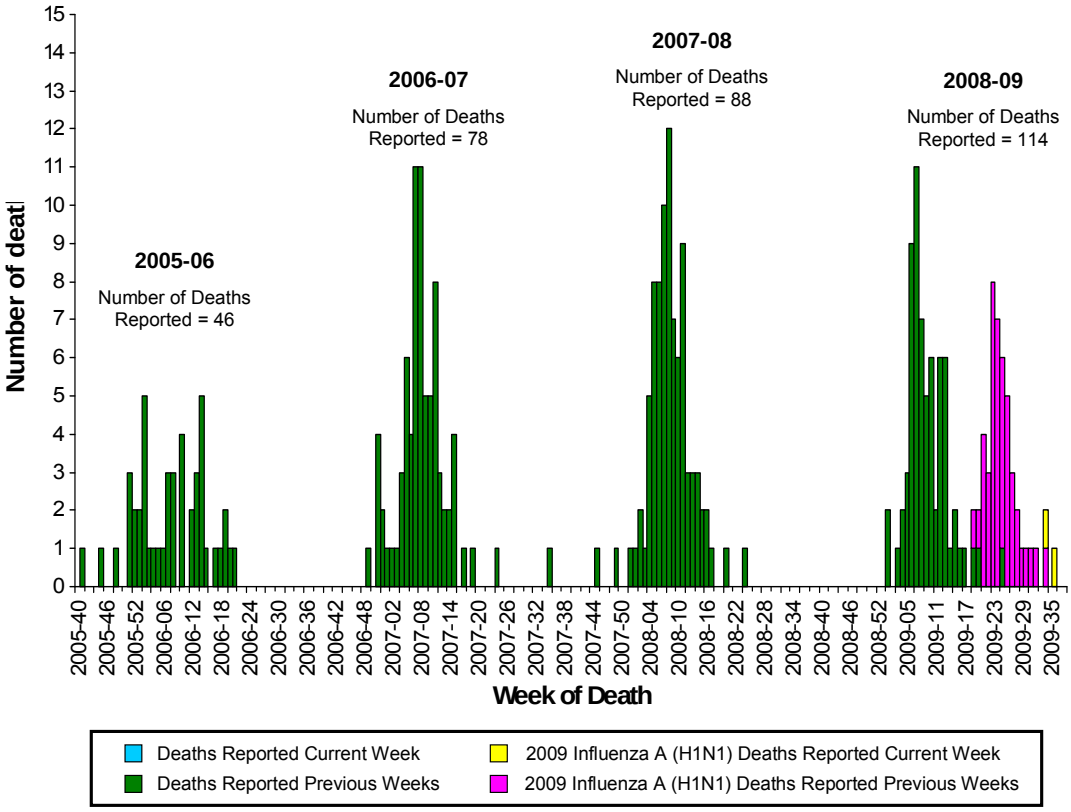
Pneumonia and Influenza (P&I) Mortality Surveillance: During week 36, 6.0% of all deaths reported through the 122-Cities Mortality Reporting System were due to P&I. This percentage was below the epidemic threshold of 6.3% for week 36.



Influenza-Associated Pediatric Mortality: Two influenza-associated pediatric deaths were reported to CDC during week 36 (Kansas and Tennessee). These deaths were associated with 2009 influenza A (H1N1) virus infection, and occurred between August 23 and September 12, 2009. Since September 28, 2008, CDC has received 114 reports of influenza-associated pediatric deaths that occurred during the current influenza season (25 deaths in children less than 2 years, 12 deaths in children 2-4 years, 34 deaths in children 5-11 years, and 43 deaths in individuals 12-17 years). Forty-six of the 114 deaths were due to 2009 influenza A (H1N1) virus infections.

Of the 47 children who had specimens collected for bacterial culture from normally sterile sites, 18 (38.3%) were positive; *Staphylococcus aureus* was identified in 12 (66.7%) of the 18 children. Five of the *S. aureus* isolates were sensitive to methicillin and seven were methicillin resistant. Sixteen (88.9%) of the 18 children with bacterial coinfections were five years of age or older and 12 (66.7%) of the 18 children were 12 years of age or older. Sixteen (34.8%) of the 46 children with confirmed 2009 influenza A (H1N1) infection had a specimen collected from a normally sterile site; four (25.0%) of the 16 children had a positive bacterial culture (methicillin sensitive *S. aureus*, methicillin resistant *S. aureus* [2], and *Streptococcus constellatus*).

Number of Influenza-Associated Pediatric Deaths by Week of Death: 2005-06 season to present

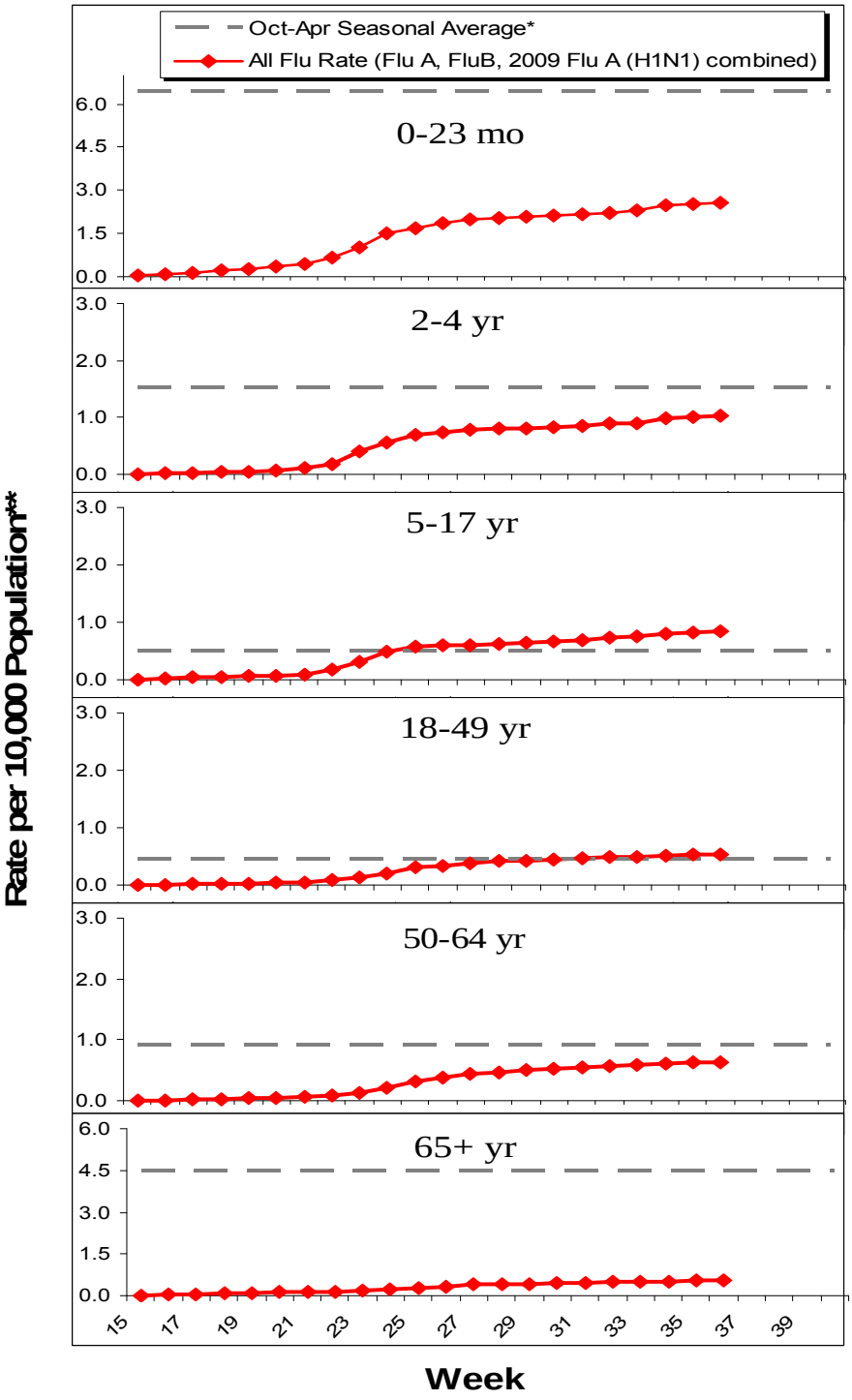


Influenza-Associated Hospitalizations: Laboratory-confirmed influenza-associated hospitalizations are monitored through the Emerging Infections Program (EIP), a population-based surveillance network.

During April 15, 2009 – September 12, 2009, the following preliminary laboratory-confirmed overall influenza associated hospitalization rates were reported by the EIP *(rates include influenza A, influenza B, and 2009 influenza A (H1N1))*:

Rates for children aged 0-23 months, 2-4 years, and 5-17 years were 2.6, 1.0, and 0.8 per 10,000, respectively. Rates for adults aged 18-49 years, 50-64 years, and ≥ 65 years, the overall flu rates were 0.5, 0.6, and 0.5 per 10,000, respectively.

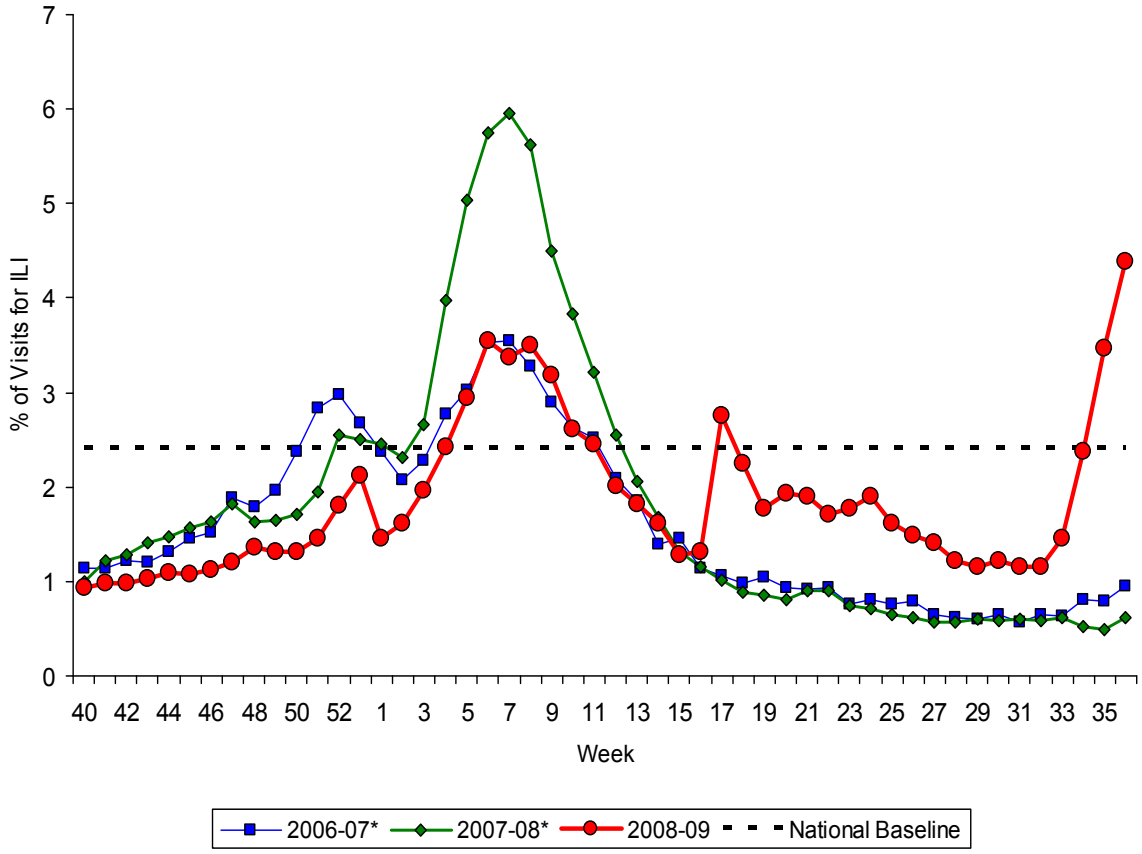
EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, Spring/Summer 2009



*This value represents an age group-specific average influenza rate from October 1 to April 30 from the 2005-06, 2006-07, and 2007-08 influenza seasons.
**Note: The scales for the 0-23 month and the ≥65 year age groups differ from other age groups.

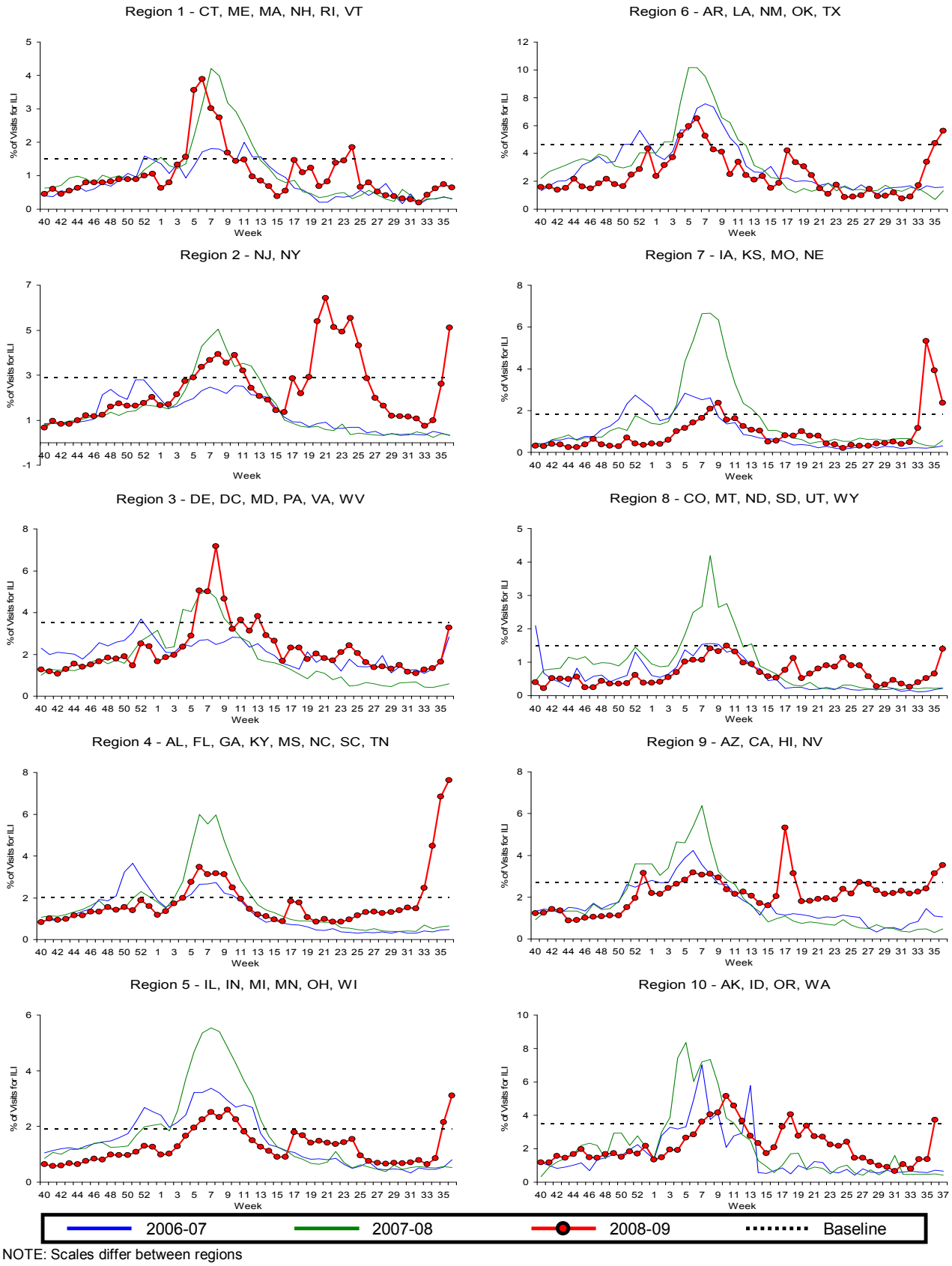
Outpatient Illness Surveillance: Nationwide during week 36, 4.4% of patient visits reported through the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) were due to influenza-like illness (ILI). This percentage is above the national baseline of 2.4%.

Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), National Summary, 2008-09 and Previous Two Seasons



*There was no week 53 during the 2006-07 and 2007-08 seasons, therefore the week 53 data point for those seasons is an average of weeks 52 and 1.

On a regional level, the percentage of outpatient visits for ILI ranged from 0.6% to 7.6%. Seven regions (Regions 2, 4, 5, 6, 7, 9, and 10) reported a proportion of outpatient visits for ILI above region-specific baseline levels, while the remaining three regions (Regions 1, 3, and 8) reported percentages of visits for ILI below region-specific baseline levels.



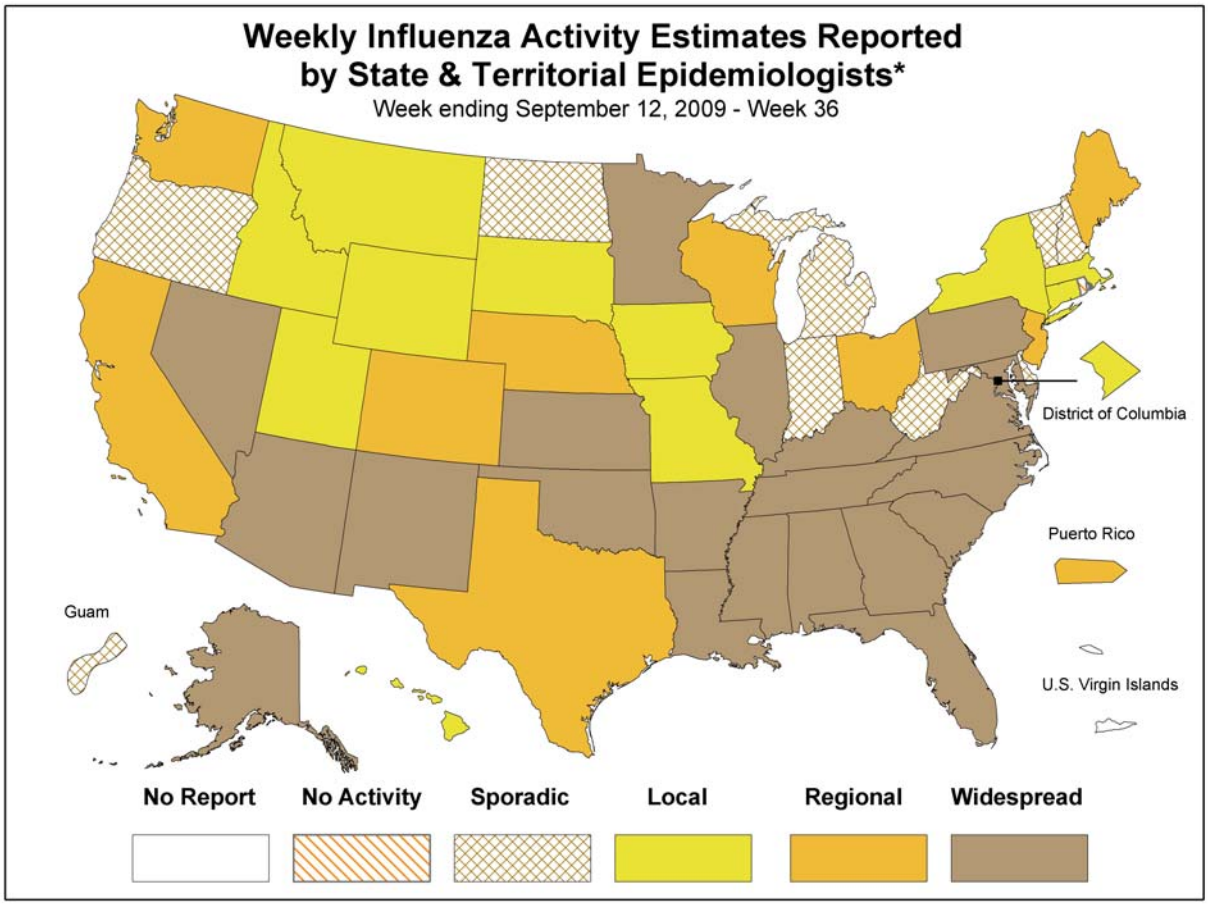
NOTE: Scales differ between regions

NOTE: There was no week 53 during the 2006-07 and 2007-08 seasons, therefore the week 53 data point for those seasons is an average of weeks 52 and 1.

Geographic Spread of Influenza as Assessed by State and Territorial Epidemiologists: The influenza activity reported by state and territorial epidemiologists indicates geographic spread of both seasonal influenza and 2009 influenza A (H1N1) viruses and does not measure the severity of influenza activity.

During week 36, the following influenza activity was reported:

- Widespread influenza activity was reported by 21 states (Alabama, Alaska, Arizona, Arkansas, Florida, Georgia, Illinois, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Nevada, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, and Virginia).
- Regional influenza activity was reported by Puerto Rico and nine states (California, Colorado, Maine, Nebraska, New Jersey, Ohio, Texas, Washington, and Wisconsin).
- Local influenza activity was reported by the District of Columbia and 11 states (Connecticut, Hawaii, Idaho, Iowa, Massachusetts, Missouri, Montana, New York, South Dakota, Utah, and Wyoming).
- Sporadic activity was reported by Guam and eight states (Delaware, Indiana, Michigan, New Hampshire, North Dakota, Oregon, Vermont, and West Virginia).
- No influenza activity was reported by one state (Rhode Island).
- The U.S. Virgin Islands did not report.



* This map indicates geographic spread & does not measure the severity of influenza activity

A description of surveillance methods is available at: http://www.cdc.gov/flu/weekly/fluactivity.htm

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